Chapter 8.4

Status of shellfish populations in the Maryland Coastal Bays

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Abstract

In 1993 the Maryland Department of Natural Resources (MDNR) initiated a comprehensive study to inventory the molluscan fauna of the Coastal Bays. Intended to establish baseline values for future management needs, both commercially important shellfish and ecologically valuable species have been targeted. Between 1993 and 1996, over 50,000 live individuals comprising 63 molluscan species and an additional 10 species represented only by dead specimens were collected. Among the findings characterizing the molluscs of the Coastal Bays were the high species diversity and pronounced geographic heterogeneity, the substantial seasonal and annual variability within these assemblages, and the elucidation of their ecological functions and habitats. The intertidal zone was numerically dominated by the ribbed mussel (*Geukensia demissa*) where it is ecologically important in processing nutrients and binding substrate, especially in salt marshes. As for commercial species, presently there are no oyster (*Crassostrea virginica*) populations inhabiting the subtidal relic shell bars of the Coastal Bays. Hard clam (*Mercenaria mercenaria*) densities, which historically have been lower than in other regions of the East Coast, are about 25% of estimates made 35 to 50 years ago, but have been relatively stable for the past 10 years. Bay scallops (*Argopecten irradians*) have recently returned and occur in most of the Coastal Bays, albeit in very low numbers. In the absence of long-term data sets, the high degree of spatial and temporal variability due to physical and biological factors creates difficulty in drawing strong conclusions about trends in molluscan population and community dynamics. Consequently, MDNR continues to track the population status of select species.

A. General Molluscan Community

Mollusc Introduction

The significance of molluscs to the estuarine ecosystem has long been recognized. Over 120 years ago the concept of an ecological community was developed through observations of the faunal assemblages of oyster reefs. Functionally, molluscs serve as a key trophic link between primary producers and higher consumers. Bivalves in particular are important as biogeochemical agents in benthic-pelagic coupling, cycling organic matter from the water column to the bottom. Predatory gastropods contribute to structuring prey assemblages and parasitic snails may serve as disease vectors within host populations. In addition, molluscs can have a pronounced impact on the physical structure of an ecosystem, whether by reworking the sediment, grazing, binding or securing existing substrate, or building new substrate such as oyster reefs. Many molluscs are commercially valuable, both directly as a harvestable resource and indirectly as a food source for commercially and recreationally important species including crabs, fish, and waterfowl. Potential threats to molluscs include invasive green crabs, QPX disease and brown tide.

Mollusc Community Data Sets

Assateague Ecological Studies, 1969-1971. Data are as number per m^2 and in tables, sample sites are given on maps.

DNR surveys, 1980-1981. Most samples were from Isle of Wight Bay. Data are in tables (number per unit area) with map of sampling sites.

Coastal Bays Joint Assessment, EPA EMAP Surveys, 1993. Data are presented in tables. Sites are depicted on maps. Latitude/longitude sample site information is available from EPA.

Mid-Atlantic Integrated Assessment, MAIA (Iteration of E-MAP). Twenty-one sites were sampled between 1997 and 1998. Focus was on Sinepuxent and lower Chincoteague Bays.

National Coastal Assessment, Iteration of E-MAP Surveys, 2000-2003.

National Park Service, 1994-1996. Box core and trawl samples in Chincoteague and Sinepuxent Bays. Includes seasonal data. Data available from NPS.

DNR Molluscan Inventory, 1993-1996. Population data were collected on individual species (density, distribution, size-frequencies, animal-sediment relationships) and community analyses from Ponar grab, hydraulic dredge, and shoreline quadrat samples. Data are available with geographic and habitat information. This three-year study represents the most comprehensive inventory of molluscan fauna in the coastal bays conducted to date.

Management Objective: Maintain optimum sustainable shellfish abundances (MCBP CCMP Objective FW 1.3)

General Mollusc Indicators:

1. Density (# live /unit area)
2. Geographic Distribution (lat/long; bay or tributary; sub-bay or region)

Data Analyses

Between October 1993 and September 1996, the DNR Shellfish Program conducted a comprehensive study to inventory the molluscan fauna of Maryland's Coastal Bays and major tributaries including the St. Martin River and Greys, Turville, and Herring Creeks. Intended to establish baseline values for future management needs, both commercially important molluscs and ecologically valuable species were targeted. Samples were collected using a Ponar grab sampler that sampled 0.05 m^2 of the bottom. The samples were then sieved through a 1 mm mesh screen and preserved. For each sample, all molluscs were identified and enumerated, and population size class structures were developed for each identified species. For an account of molluscan sampling, see Tarnowski 1997b. During the three- year period approximately 1,800 stations were sampled using five different collection methods including hydraulic escalator dredge, oyster handscrape, Ponar sampler, clam rake, and intertidal quadrate.

Results: General Mollusc Status

Over 50,000 live individuals comprising 63 mollusc species were collected; an additional 10 species were represented by dead specimens only (for a full species list see Appendix A of this volume). Sixteen of these species had not been reported in previously published accounts of the Coastal Bays, including three northern range extensions.

A total of 1,020 Ponar bottom grab samples generated information on population and community parameters such as species composition and hierarchy, distribution, richness (diversity), abundance, size structure, and habitat characterization. Among the findings were the highly diverse nature of the Coastal Bays molluscan communities; the significantly lower molluscan abundances and species richness in the coastal tributaries when compared with the open bays; the strong relationships of the species with habitat types including sediment, vegetation, shell cover, and other biogenic structures; the elucidation of ecological communities and functions of the Coastal Bays molluscs; the pronounced geographic heterogeneity of the assemblages; and the distinctive and substantial variability in the molluscan community over time, both on a seasonal and annual basis. Because the Maryland Coastal Bays are situated at the overlap of two faunal provinces (Virginian and Carolinian), shifts in community composition may serve as an indicator of climatic change. However, the spatial and temporal variability due to physical and biological factors can confound short-term attempts at detecting disturbances, whether natural or anthropogenic.

In addition to the bottom grab survey, 67 intertidal shoreline quadrat stations and nine intertidal structure stations were sampled. The intertidal zone was numerically dominated by the ribbed mussel, *Geukensia demissa*, where it is ecologically important in processing nutrients and binding substrate, especially in salt marshes. Intertidal structures can provide additional scarce, hard substrate as a supplement, but not substitute, for existing natural intertidal shoreline.

General Mollusc Summary

Among the findings characterizing the molluscan shellfish communities of the Coastal Bays was high species diversity, with significantly lower abundances in coastal tributaries than open bays. Coastal Bays molluscan communities (the types of species and number of animals) varied considerably from location to location and over time showing high seasonal and annual variability. Community structure was strongly influenced by habitat conditions, including the type of sediment, biogenic structures (such as worm tubes, seagrasses, and shell cover), interaction with other biological communities, and natural catastrophic events. This high degree of variability makes it difficult to draw strong conclusions about trends in these communities.

B. Hard Clams

Introduction

The hard clam (*Mercenaria mercenaria*) has long been an important species both in terms of sustenance and commerce. In addition to being items of food for the indigenous people of the Coastal Bays, the clams were highly valued as a source of purple shell for making wampum beads, the common currency of exchange among tribes all along the Atlantic coast. During more recent times, the hard clam was one of the species that flourished in the Coastal Bays after the Ocean City Inlet opened in 1933. Prior to that time, the population was confined to the higher salinities in southern Chincoteague Bay. Significantly, the improvement of commercial shellfish resources was one of the primary rationales for allocating funds to construct and stabilize a new inlet. Just before construction was to begin, a hurricane serendipitously breached the island at the southern edge of Ocean City, which the Army Corps of Engineers quickly stabilized. New clam populations and an associated fishery subsequently developed throughout the bays. Since the 1960's, the hard clam has supplanted the oyster in commercial landings and value in the Coastal Bays and is the basis of a recreational fishery, especially for tourists that visit the region during the warmer months.

Hard Clam Data Sets

Md. Department of Research and Education. 1952-1953. System-wide hard clam study includes density, distribution, size structure, and habitat.

University of Maryland Assateague Ecological Studies. 1969-1970. This study uses the same data classes as above, with emphasis on eastern Chincoteague Bay. No samples were taken north of the Ocean City Inlet.

Maryland Department of Chesapeake Bay Affairs; MDNR. 1968-1971. Surveys of commercial hard clam areas were conducted.

Maryland Conservation Department; MD Bureau of Natural Resources; MD Department of Chesapeake Bay Affairs. 1928-1969. Annual Reports. Annual landings and licensing data as well as occasional anecdotal information.

DNR Shellfish Program. 1993-present. These system-wide hard clam surveys includes density, distribution, size structure, habitat and other organisms. Bay scallops are included in this survey, in addition to limited surveys dedicated to this species.

Management Objective: Maintain optimum sustainable clam abundances (MCBP CCMP objective FW 1.3)

Hard Clam Indicators:

Primary

1. Clam Density (# live/unit area)
2. Geographic Distribution of clams (lat/lo; bay or tributary; sub-bay or region)

Secondary

1. Size-Frequency Distribution of clams (% frequency)

Tertiary

1. Mortality
    a) Natural (boxes*/unit area)
    b) Harvest (commercial landing records)
2. Disease

* Boxes refer to articulated, empty shells and are indicative of recently dead clams.

Data Analyses

Hard clams have been sampled in Chincoteague Bay since 1993 and throughout the Coastal Bays almost annually from 1994 using a commercial hydraulic escalator dredge. The dredge was towed through a 76.2 m course at each site, effectively sampling 58.1 m^2. A size-bias is associated with this gear; it does not adequately sample clams smaller than 31 mm shell length. For more details about hard clam data collection and analysis, see Homer 1997.

Hard Clam Results: Status and Trends

Table 8.4.1. Summary of DNR Hard Clam Surveys (1993/94-2003) and 1953 clam densities.

	Nine Year Averages (1994-2003)					1953
	Total n	Length (mm)	%< 51 mm	% Dead	Live/m^2	Live/m^2
Chincoteague Bay[1]	952	74.6	14.2	5.3	0.27	1.30
Newport Bay	113	78.6	6.3	19.3	0.14	0.40
Sinepuxent Bay	167	71.4	21.0	3.4	0.32	1.04
Isle of Wight Bay	144	69.6	23.9	2.0	0.28	1.19
Assawoman Bay	120	73.1	15.8	4.2	0.16	1.00
St. Martin River[2]	40	85.2	0.0	18.6	0.04	0.14

[1] (1993-2003)

[2] (1996 – 1997)

Table 8.4.2. Annual rankings of Coastal Bays hard clam densities arranged from highest (top) to lowest (bottom). Average is for the years 1994 to 2003.

1953	1994	1996	1997	2000	2001	2002	2003	9 Yr. Avg.
Chin	Sin	Sin	Sin	Chin	Sin	IoW	IoW	Sin
IoW	Chin	Chin	IoW	Sin	Chin	Sin	Sin	IoW
Sin	IoW	Iow	Chin	IoW	Iow	Chin	Chin	Chin
Assa	Assa	Assa	New	Assa	Assa	Assa	Assa	Assa
New	New	New	Assa	New	New	New	New	New
StM		StM	StM					StM

Chincoteague Bay

a) 2003 Status

A total of 102 samples were taken employing a commercial clamming vessel equipped with a hydraulic escalator dredge (Figure 8.4.1). Average density was 0.21 clams/m^2, ranking Chincoteague Bay third among the five bays. Clams were more abundant on the east side of the bay, with highest concentrations in the southeastern quadrant (0.28 clams/m^2) (Figure 8.4.2). The lowest density was in the western bays complex (0.14 clams/m^2). The proportion of boxes in the population was 7.8%. The average length of the clams was 76.8 mm, with only 7.5% in the 31 - 50 mm size class, indicating relatively low recruitment.

b) 10-Year Trend

Since 1993, a total of 952 stations were sampled in Chincoteague Bay; surveys were not conducted in 1995 and 1999 (Table 8.4.1). Hard clam population densities remained relatively stable over the ten-year interval, with a modest increase observed in 2000 (Figure 8.4.3), when Chincoteague Bay ranked first among the Maryland Coastal Bays (Table 8.4.2). Densities over the past two years were somewhat lower than the ten-year average of 0.27 clams/m^2. Generally, clam densities were higher on the east side of the bay during this period. Boxes comprised 5.3% of the population. The ten-year average length of the clams was 74.6 mm, with 14.2% in the 31 - 50 mm size class. Recruitment was sporadic, with higher than average proportions of these small clams observed in 2000 and 2001, while five of the years were sub par (Figure 8.4.4).

c) 50-Year Benchmark

Four surveys were conducted intermittently over a 17-year interval prior to the DNR effort, but only the 1953 survey included the entire coastal system. Three of the studies were during the 1950's, when most of the population had been established for only about 20 years. These initial densities were low relative to other regions along the Atlantic coast and steadily declined during this period, from 1.34 clams/m^2 in 1952 to 1.09 clams/m^2 in 1969. In 1953 Chincoteague Bay had the highest clam densities of the Maryland Coastal Bays and was five times higher than the present 10-year average (Table 8.4.2). Mortality data were not available for these surveys. The average length was little different from the present, ranging between 82.5 mm (1952) and 71.9 mm (1969). Recruitment seems to have always been low, with the proportion of clams between 31 mm and 50 mm in length varying from 2.2% in 1952, to 7.6% in 1958, and to 14.4% in 1969.

Newport Bay

a) 2003 Status

Hard clam densities averaged 0.12 clams/m^2 over 9 stations, the lowest density of the Coastal Bays (Figures 8.4.2 and 8.4.3). Boxes comprised 21.2% of the Newport Bay population. The average length of these clams was 78.2 mm, with 5.1% of the clams between 31 mm and 50 mm.

b) 9-Year Trend

Since 1994, a total of 113 samples were taken in Newport Bay; surveys were not conducted in 1995 and 1999 (Table 8.4.1). Clam densities were consistently the lowest of the five primary Coastal Bays, averaging 0.14 clams/m^2 (Figure 8.4.2). In contrast, box counts were the highest, averaging 19.3% of the population. The high percentage of boxes was probably due to the low level of clamming activity in this bay which allowed a greater rate of senescent mortality, with the boxes accumulating undisturbed by harvesting and protected in the soft sediment. This was further suggested by the high proportion of larger, older clams, with an average length of 78.6 mm. Recruitment was consistently poor, averaging 6.3% of the sampled population between 31 mm and 50 mm in length (Figure 8.4.4).

c) 50-Year Benchmark

Newport Bay always ranked lowest in clam densities among the Maryland Coastal Bays (Table 8.4.2). Between 1952 and 1969, densities dropped from 0.51 clams/m^2 to 0.08 clams/m^2, which was lower than the present population. Historic recruitment data were not available.

Sinepuxent Bay

a) 2003 Status

The average live clam density of 0.23 clams/m^2 was the lowest recorded in Sinepuxent Bay, even though this was second highest among the Maryland Coastal Bays this year; 23 samples were collected (Figure 8.4.2). Boxes accounted for 3.7% of the population. The average length was 73.8 mm, with 14.5% of the sampled population between 31 mm and 50 mm.

b) 9-Year Trend

Sinepuxent Bay placed first or second in live clam densities every year since 1994 and ranked first overall during this period (Table 8.4.2), averaging 0.32 clams/m^2 with 167 samples taken in total (Table 8.4.1). Surveys were not conducted in 1995 and 1999. The peak density of 0.47 clams/m^2 in 1996 was the highest recorded of the Coastal Bays during this period (Figure 8.4.3). The 9-year average observed natural mortality was 3.4%. This was one of the more consistent areas of recruitment, with 21.0% of the clams under 51 mm and the population averaging 71.4 mm in length. There was a series of relatively productive years in the mid to late 1990's, although the last three years have been somewhat below average (Figure 8.4.4).

c) 50-Year Benchmark

Surveys in 1953 and 1969 yielded similar densities of about one clam/m^2. Recruitment data from the 1950's comparable to the present surveys were not available, although this bay was considered to have the most consistent recruitment. Recruitment in 1969 was lower than the present trend, with 11.1% of the population between 31 mm and 50 mm in length.

Isle of Wight Bay

a) 2003 Status

This bay had the highest clam density of the Maryland coastal ecosystem, averaging 0.32 clams/m^2 from 21 samples (Figure 8.4.2). The observed natural mortality was 2.0%. The average length was 75.0 mm, with 13.3% of the population between 31 mm and 50 mm.

b) 9-Year Trend

Isle of Wight Bay placed first in clam densities during the past two years (Table 8.4.2, Figure 8.4.2), and over the 9-year period averaged 0.28 clams/m^2 from 144 samples (Table 8.4.1), barely edging out Chincoteague Bay for second place. Observed natural mortality was the lowest of the Coastal Bays, with boxes accounting for 2.0% of the population. This bay enjoyed good recruitment over the past few years, with the proportion of clams smaller than 51 mm averaging 23.9% over the 9-year period and peaking at 46.9% in 2002 (Figure 8.4.4). This was reflected in the lower average length of the sampled population, 69.6 mm.

c) 50-Year Benchmark

Prior to 1994, the only hard clam survey in this bay was conducted in 1953. The average clam density was 1.19 clams/m^2, which ranked second among the Coastal Bays. Historic recruitment data comparable to the present surveys were not available.

Assawoman Bay

a) 2003 Status

A total of 15 stations (Figure 8.4.1) yielded an average density of 0.18 live clams/m^2 (Figure 8.4.2) and an observed natural mortality of 4.2%. The average length of the sampled population was 68.5 mm, with 15.9% of the clams between 31 mm and 50 mm.

b) 9-Year Trend

Clam densities were low relative to most of the other Coastal Bays, although fairly stable (Figure 8.4.3). The 9-year average of 0.16 clams/m^2, based on 120 samples, was slightly higher than Newport Bay (Tables 8.4.1 and 8.4.2). The observed mortality was also consistently low, averaging 4.2%. Recruitment was poor during the mid-1990's but jumped in 2000 (Figure8.4.4). Like Isle of Wight Bay, the peak year was 2002, when 42.1 % of the clams were under 51 mm. This trend is reflected in the average lengths, which went from 80.6 mm in 1996 to 58.7 mm in 2002, resulting in a 9-year average of 73.1 mm.

c) 50-Year Benchmark

Prior to 1994, the only hard clam survey in this bay was conducted in 1953. The average clam density was 1.0 clam/m^2. Historic recruitment data comparable to the present surveys were not available.

St. Martin River

a) Recent Status

This coastal tributary was surveyed in 1996 and 1997, when a total of 40 samples were taken (Table 8.4.1). Clams were observed at only 52% of the stations, whereas in the bays they were found at almost 100% of the stations. Clam densities were the lowest of any Coastal Bays region, averaging 0.03 clams/m^2 in 1996 and 0.04 clams/m^2 in 1997 (Figure 8.4.3). Clam lengths were the largest of the Coastal Bays, averaging 85.2 mm for the two years. No clams were smaller than 51 mm in length. This river has been closed to shellfish harvesting for many years.

b) 50-Year Benchmark

This tributary seems to be inhospitable to hard clams. The 1953 survey averaged 0.14 clams/m^2, well below the contemporaneous densities observed in the bays (Table 8.4.1). However, this figure was based on only three stations. Historic recruitment data comparable to the present surveys were not available.

Hard Clam Summary

Current hard clam densities in all of the bays were lower than historic levels. Although closed to shellfish harvesting, the St. Martin River historically had the lowest clam densities in the Coastal Bays. The Coastal Bays populations were dominated by older, larger clams, with recruitment generally low and sporadic in most areas except in parts of Sinepuxent and Isle of Wight Bays.

C. Oysters

Introduction

The Eastern oyster (*Crassostrea virginica*), also known as the Chincoteague oyster, has long been prized for its salty flavor, providing profitable livelihoods to generations of watermen in the remote villages along the shores of the bay. Immediately following the Civil War, the unique conditions of the region led to the culturing of oysters, an advanced practice at the time that no doubt sustained the industry much longer than it otherwise would have lasted. In addition to its commercial value, oysters are ecologically important as reef builders, contributing structure and hard substrate to a rich community of organisms associated with them in an otherwise soft-bottom environment. The shell provides protection from predation in areas that are otherwise devoid of shelter, benefiting the newly settled juveniles and small adults of numerous species, including hard clams. Episodic natural events, in particular the opening and stabilization of the Ocean City Inlet, fundamentally changed the Coastal Bays ecosystem, creating a situation where oyster populations, whether natural or cultured, and the industry they supported, could no longer exist. Equally important, the demise of the Coastal Bays oyster has resulted in the loss of a critical functional component of the ecosystem as well as the gradual disappearance of a significant structural element.

Oyster Data Sets

Yates oyster bars survey of 1907.

Maryland Conservation Bureau; Maryland Conservation Department; Maryland Bureau of Natural Resources; Maryland Department of Chesapeake Bay Affairs. 1916-1969. Annual Reports. Annual landings and licensing data as well as occasional anecdotal information are detailed.

DNR oyster bars survey of 1994. This survey revisits the old Yates bars. Data include surface shell per 1.5 minute dredge tow and associated species. No oysters were found.

DNR 1994-1995. Intertidal survey of Chincoteague Bay. Data include molluscan species, abundance (live and dead), and sizes per 0.25 m^2 quadrat.

DNR 1994-1995. Oyster survivorship study in Chincoteague Bay. Data include survivorship, growth, disease, and predation from arrays of suspended bags containing hatchery reared oysters.

DNR 1999-present. Dynamics of an intertidal oyster population in West Ocean City. Data include density of live and dead, recent or old boxes, height-frequency distributions, spat settlement, presence of drill holes, number of drills, presence of other species, and disease analysis.

Management Objective: none

Oyster Indicators:

A. Primary (all species)
  1. Density (# live/unit area)
  2. Geographic Distribution (latitude/longitude; bay or tributary; sub-bay or region)

B. Secondary (species of particular interest)
  1. Size-Frequency Distribution (% frequency)

C. Tertiary (species of particular interest)
  1. Mortality
    a) Natural (boxes/unit area)
    b) Harvest (commercial landing records)
  2. Disease

Data Analyses

In 1994, formerly charted oyster bars were sampled by handscrape at 150 locations throughout Chincoteague Bay. For details, see Tarnowski 1997c.

Results: Oyster Status and Trends

1. Recent Status

Presently there are no viable oyster populations inhabiting the subtidal bars of the Coastal Bays.

In addition to the 150 handscrape tows on the former oyster bars of Chincoteague Bay, more than 1,500 clam dredge stations throughout the coastal system, many of them on the old oyster grounds, were sampled over the past ten years and never has a live oyster been found. To a large extent, the bars themselves have been buried by sediment, greatly reducing this ecologically important habitat (Figure 8.4.5).

Small, relict populations still exist intertidally at a few locations throughout the Coastal Bays, with occasional spatfall on man-made structures such as riprap, pilings, and bridge supports. MDNR Shellfish Program has been monitoring one such population in West Ocean City since 1999 (Figure 8.4.6). Despite the long-term absence of significant oyster populations, two oyster diseases, Dermo (*Perkinsus marinus*) and SSO (*Haplosporidium costalis*), are still active in the Coastal Bays.

2. Historical Trends

The Yates Survey of 1907 identified 1,665 acres of oyster bars in the Coastal Bays, all confined to Chincoteague Bay (Figure 8.4.5). No bars existed in the upper bays because the salinity was too low to support oysters. Even in the northern portion of Chincoteague Bay, oysters were subjected to occasional killing freshets, and poor growth and sporadic spatfalls were the norm. With the opening of the Ocean City Inlet in 1933 and its subsequent stabilization came the expectation that oysters would flourish, creating a scramble to obtain leases for oyster growing bottom. This optimism was short-lived, however, as a host of problems associated with increased salinities ultimately proved ruinous to the oyster industry. The elevated salinities allowed predators, particularly oyster drills, to thrive. Fouling organisms that compete for food and hard substrate also found conditions more suitable. Although the natural oyster populations rapidly declined, the culture based industry still managed to exist for some time longer. The death knell of the oyster industry sounded when disease came to the Coastal Bays in the late 1950's. The last recorded landings were in 1983.

Oyster Summary

The demise of the Coastal Bays oyster has resulted in the loss of a critical functional component of the ecosystem as well as the gradual disappearance of a significant structural element.

C. Bay Scallops

Introduction

Among the more exotic of the Coastal Bays bivalves is the bay scallop (*Argopecten irradians*). Unlike other species, which are bound to some substrate either by burrowing or attachment, adult bay scallops are free-living and extremely motile, even though they lack a characteristic foot that most active bivalves possess. They are capable swimmers for short distances, which they accomplish by jetting water through their valves, generally in response to predators. Other unusual scallop attributes are their 18 pairs of blue eyes and hermaphroditic reproductive strategy, concurrently possessing both male and female sex organs. Bay scallops have relatively short life spans of only about 12 to 24 months, compared to the 40-year maximum life span of the hard clam. Their preferred habitat is eelgrass beds (providing the beds are not too thick or underlain by soft sediments), although they can also be found on other firm substrates such as shell and hard sand. Traditionally, scallops have been appreciated both for their succulent flavor and the aesthetic value of their shells.

Scallop Data Sets

Data sets for scallops are identical to those used for hard clams.

Management Objective: Re-establish bay scallop populations in the bays (FW 1.3).

Bay Scallop Indicators:

Primary (all species)

Scallop Indicator 1: Density (# live/unit area)
Scallop Indicator 2: Geographic Distribution

Secondary (species of particular interest)

1. Size-Frequency Distribution (% frequency)

Results: Scallop Status and Trends

Current Status

Bay scallops have been found in all of the Coastal Bays except Newport Bay, albeit in very low numbers (Figure 8.4.7). Scallops were caught at about 4% of the 2003 Hard Clam Survey stations, primarily in northern Chincoteague Bay, Sinepuxent Bay, and Isle of Wight Bay. These were all from the 2002 year class, ranging in lengths from 30 mm to 43 mm.

Historical Trends

Evidence of former bay scallop populations in the Coastal Bays includes ancient shells dredged up during the hard clam surveys or scattered on the beaches of Assateague Island. During the 1920's bay scallops were the object of a modest but lucrative fishery based in Chincoteague, Virginia. Generally, however, salinities in the Maryland Coastal Bays during this period were too low to support scallops. Although the opening of the Ocean City Inlet in 1933 raised salinities to suitable levels, bay scallops were unable to exploit the new areas available to them because the eelgrass beds, their preferred habitat had been largely eliminated by "wasting disease" during the early 1930's. Scallops made a brief return to the Coastal Bays during the late 1960's but soon disappeared, most likely because the recovering seagrass beds were not extensive enough to sustain a population.

In an attempt to re-establish a population in Chincoteague Bay, the Maryland DNR Shellfish Program planted 1.2 million bay scallops and raised them to reproductive age during 1997 and 1998. At the same time, wild scallops of unknown origin appeared in the vicinity of the Virginia/Maryland state line. In 2002, for the first time live scallops were recorded north of the Ocean City Inlet, both in Isle of Wight and Assawoman Bays. Considering the inadequate habitat conditions for this species that had existed in the upper bays until recently (low salinity prior to 1933, absence of eelgrass beds afterwards), these scallops were possibly the first to occur in this area in well over a century.

Bay Scallops Summary

Although low densities suggest that the long-term viability of the bay scallop population is still in question, the extraordinarily rapid range expansion is a major step toward their establishment in the Coastal Bays.

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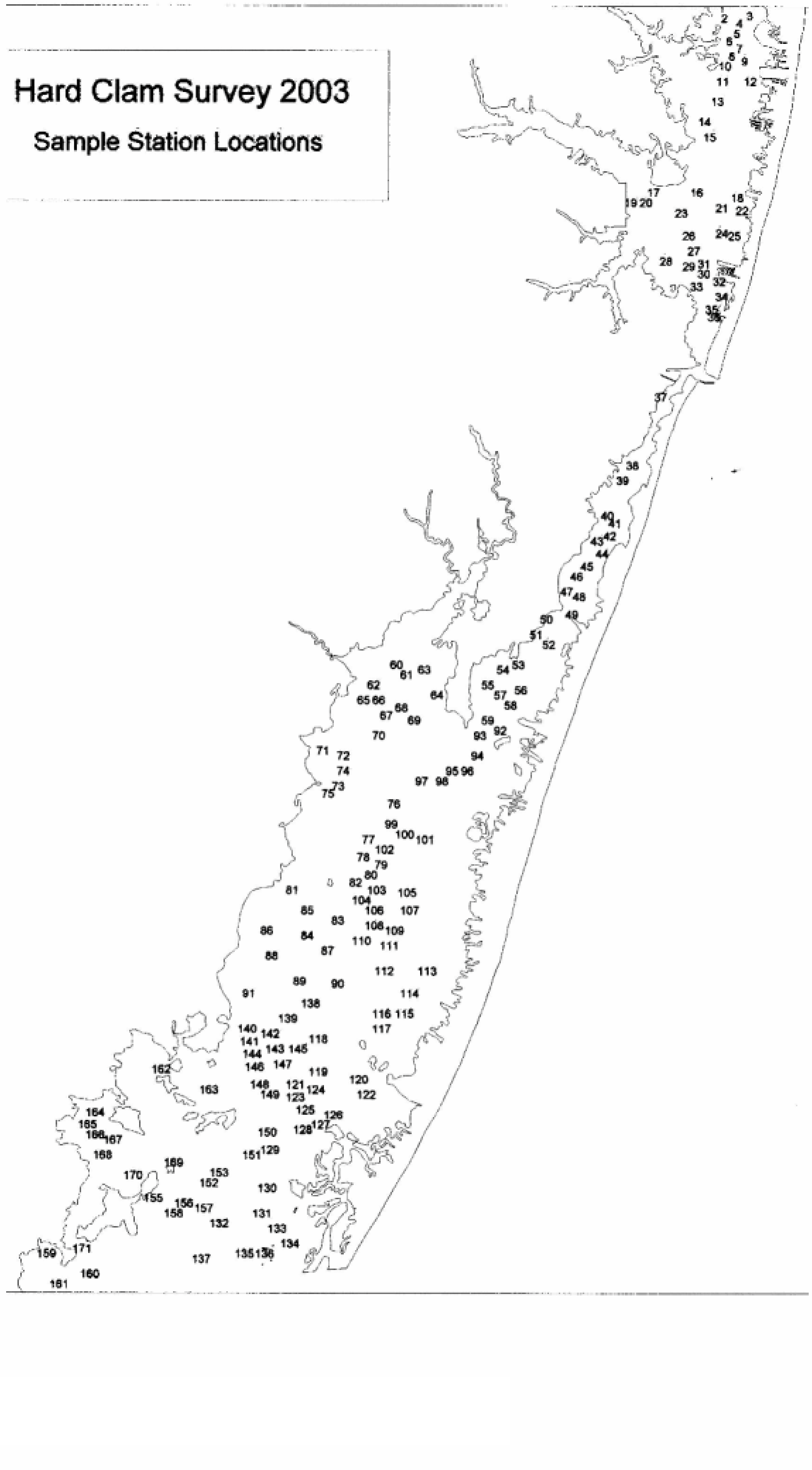

Figure 8.4.1: Hard clam survey station locations, 2003.

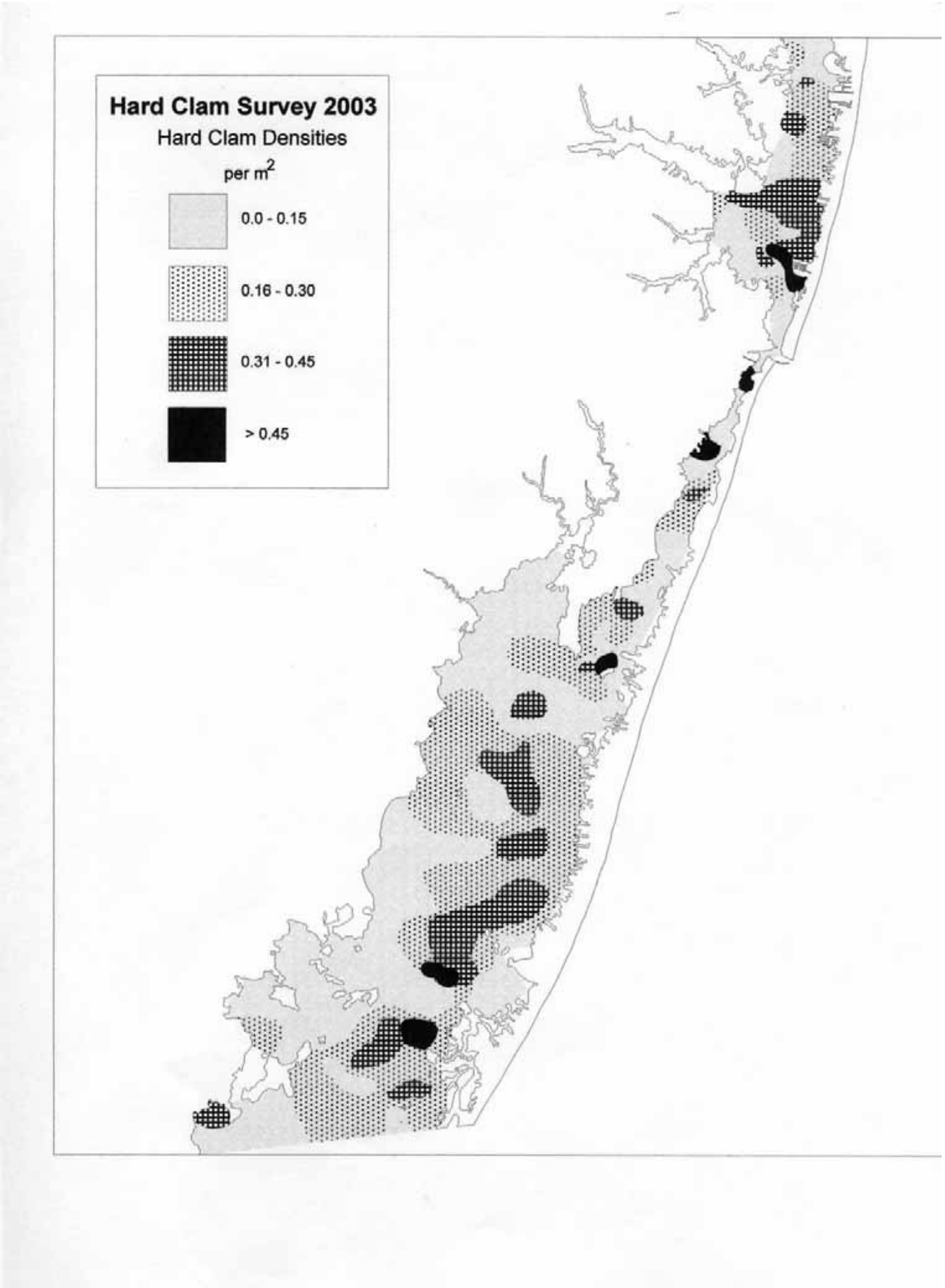

Figure 8.4.2: Hard clam densities based on 2003 hard clam survey. Clam density is measured in number of live clams/m^2.

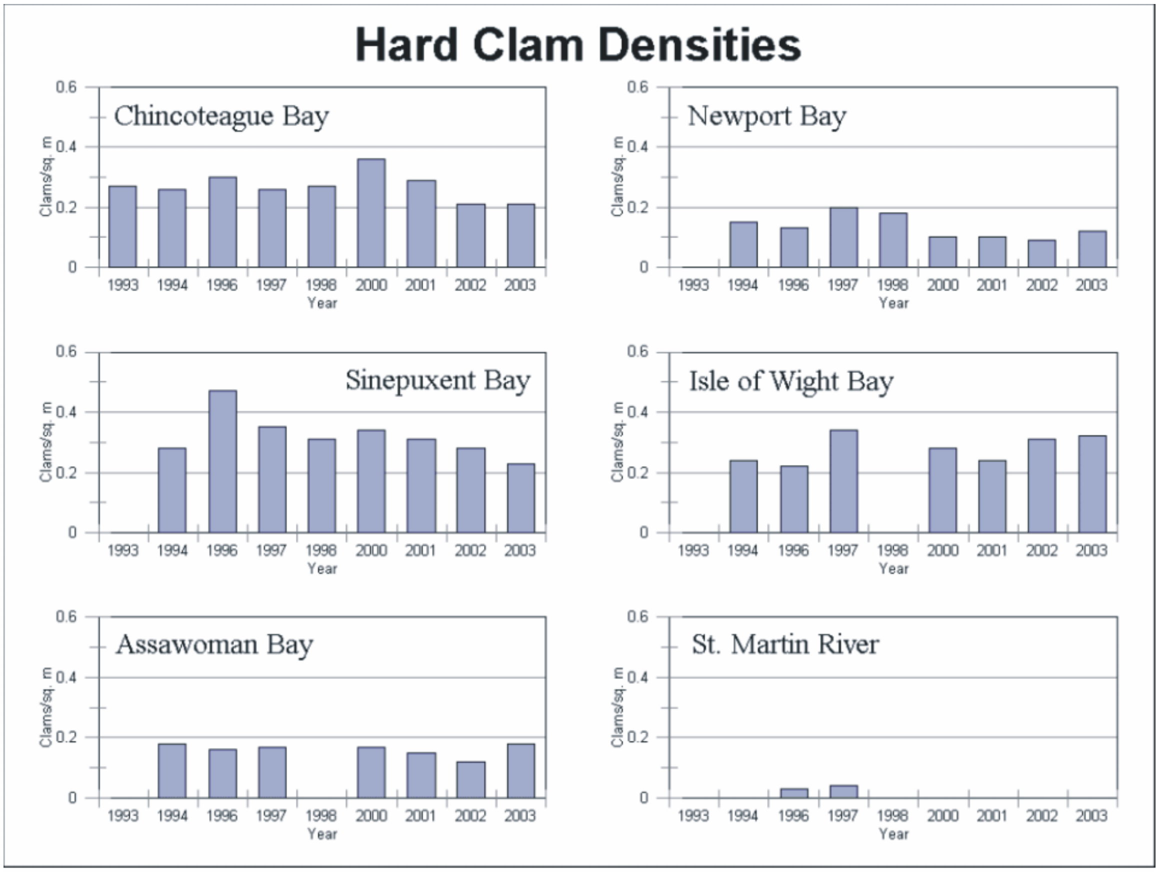

Figure 8.4.3: Hard clam densities per Coastal Bays segment, 1994-2003 trends. Only Chincoteague Bay was surveyed in 1993.

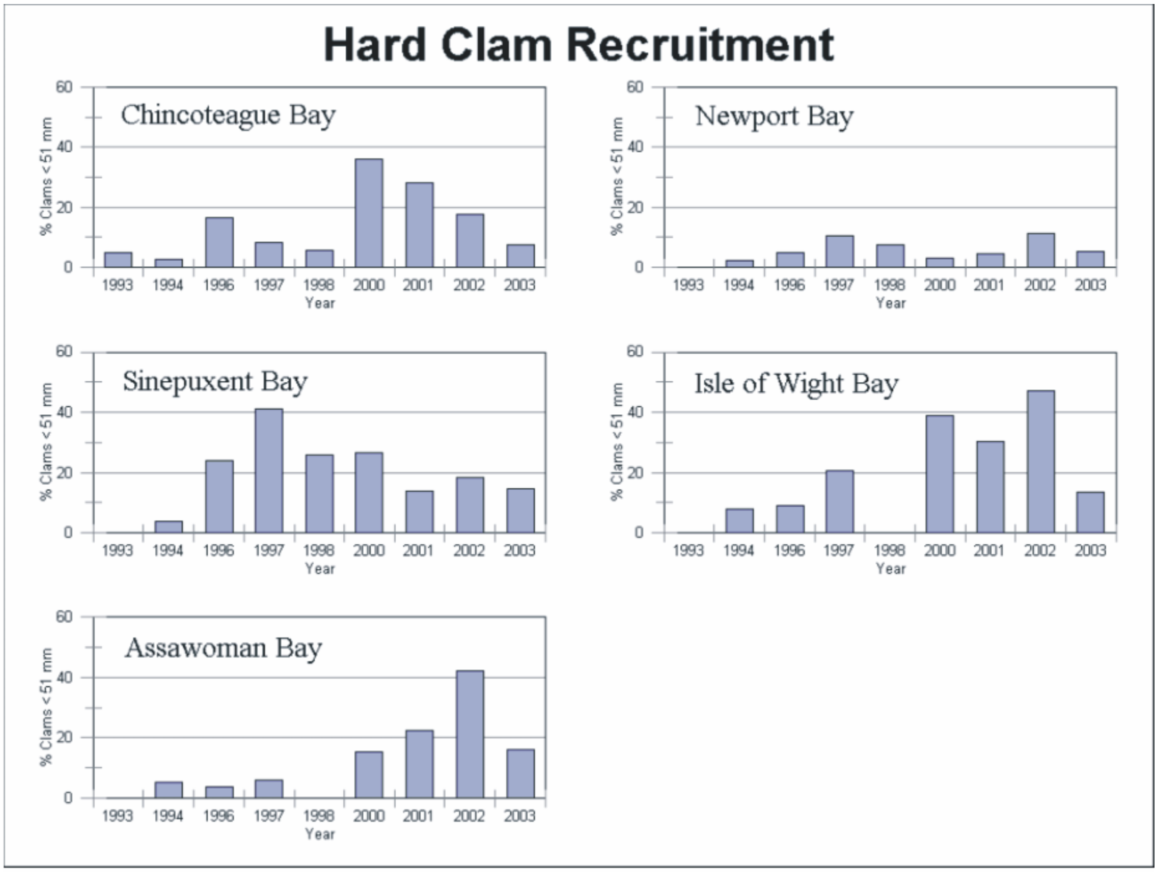

Figure 8.4.4: Hard clam recruitment per Coastal Bays segment, 1994-2003 trends. Only Chincoteague Bay was surveyed in 1993.

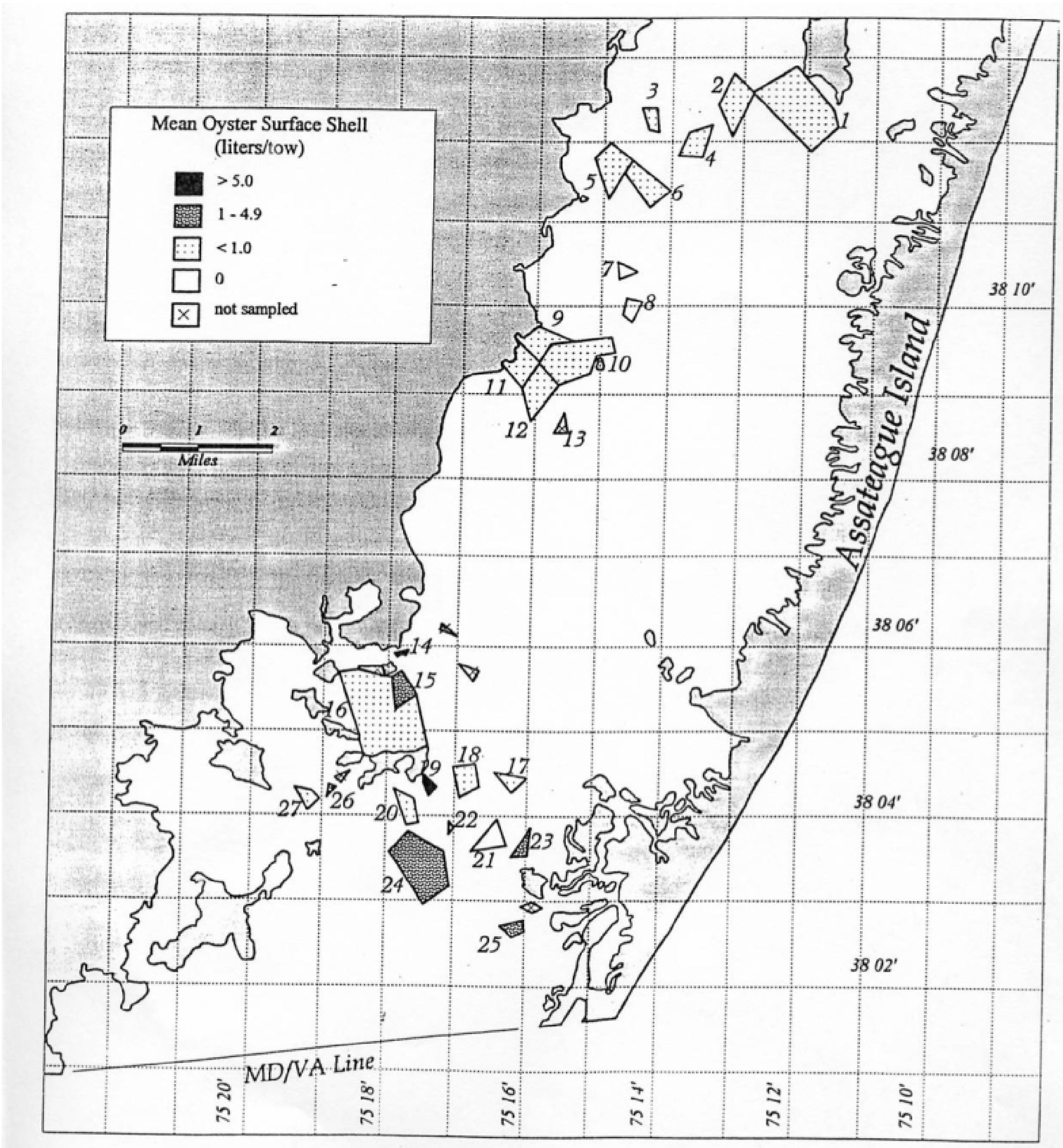

Figure 8.4.5: Oyster shell densities on former oyster bars in Chincoteague Bay, 2004.

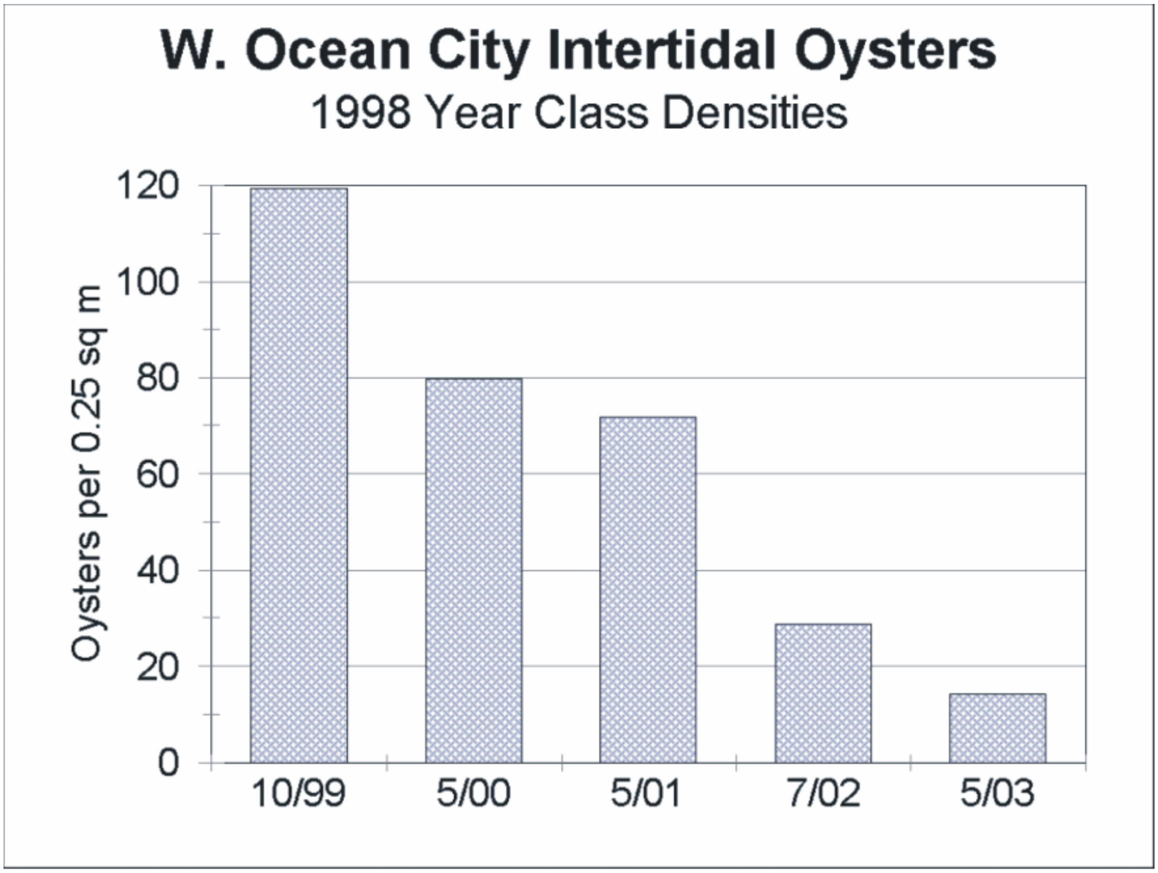

Figure 8.4.6: Trend in intertidal oyster densities near West Ocean City, 1999- 2003. Oysters are from 1998 year class.

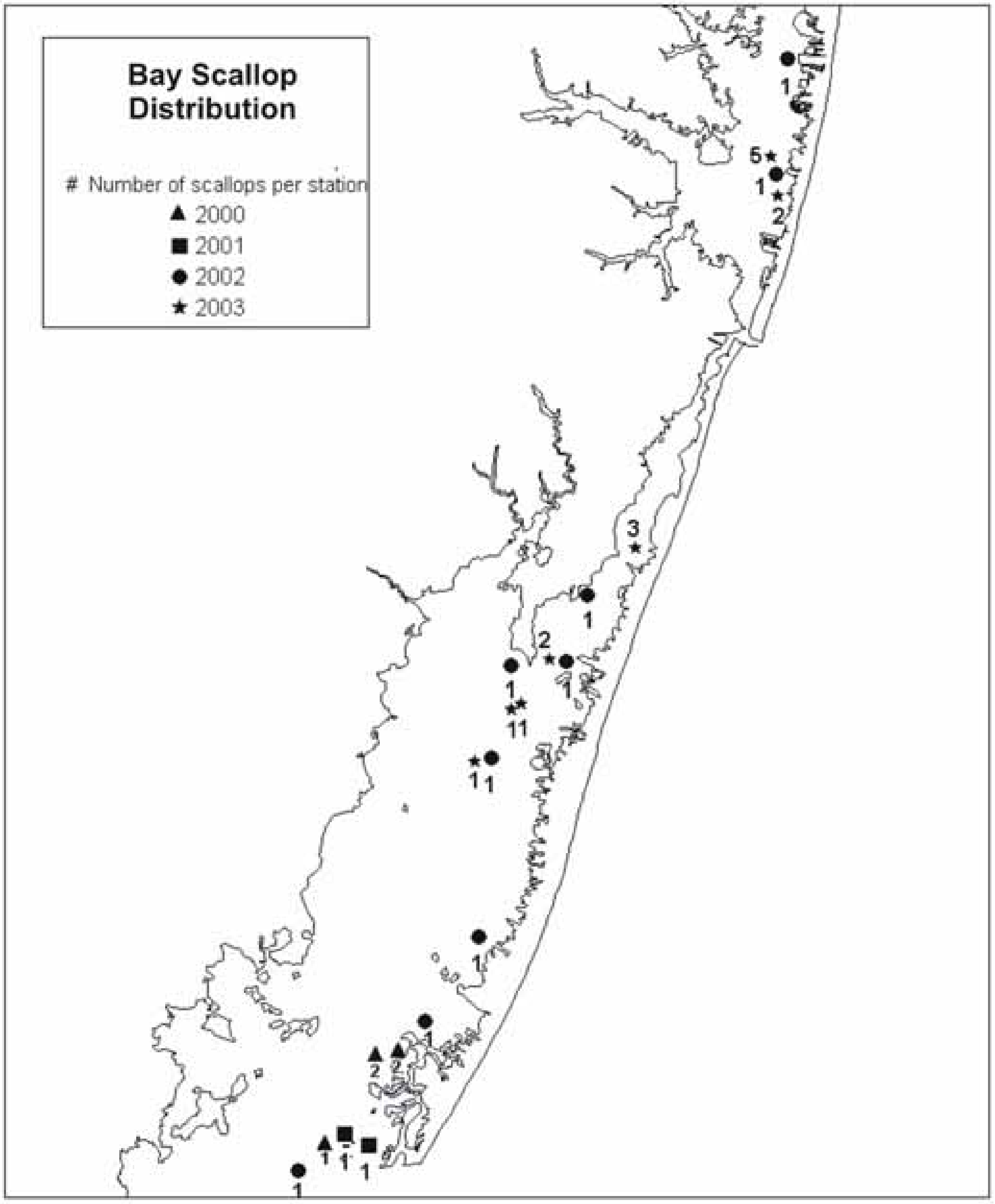

Figure 8.4.7: Bay scallops collected during clam surveys, 2000 - 2003. Numbers within map symbols represent the number of live bay scallops collected.